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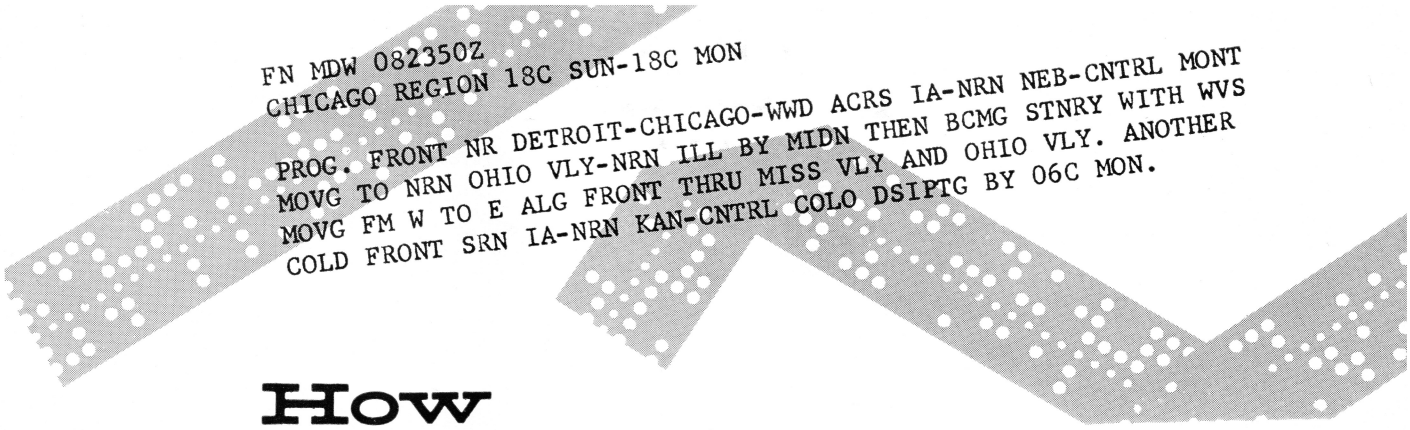

How Weather Forecasts Are Made

Here before the dying embers
I sit and weigh my last regrets;
When I'm right, no one remembers;
When I'm wrong, no one forgets.

—A Weatherman's Lament

by C. R. Elford and R. H. Shaw

WE'VE BEEN looking in previous articles in this series at some of the factors that cause weather to behave as it does. Now let's see how a weather forecast is made. We'll "look in" briefly on the operations of the United States Weather Bureau—the government's official weather forecasting agency.

As individuals certainly, none of us have all of the facilities used by the Weather Bureau in making weather forecasts. But an understanding of the bureau's activities can help in making better use of the forecasts we receive from them.

Many Involved . . .

One of the first things we'd notice if we were actually watching the Weather Bureau at work would be the teamwork involved—with each member carrying out his special part of the operation. The persons who make the final forecasts could not do so without the help of many others.

Thousands of weather observations are made each day throughout the United States and the rest of the northern hemisphere. Reports of these are collected by radio, telephone, telegraph and teletype. These are summarized and distributed to Weather Bureau offices throughout the country. The very amount of this mass of data makes it unlikely that any one station would be able to digest and analyze it without help.

The Analysis Center in Washington, D.C., provides a staff whose sole job is to plot these reports—and then to draw the charts and maps representing the present conditions in the atmosphere. Some maps show only the conditions near the earth's surface. Others show temperature, pressure, wind and moisture at various levels up to nearly 100,000 feet. Graphs are developed to show the vertical distribution or "stacking" of these weather elements at many points over the country. These maps, charts and graphs are sent out by "facsimile" over telephone lines to Weather Bureau offices all over the nation.

While this is going on, other specially trained meteorologists are studying the weather situation to estimate what these charts and maps will look like 24, 36 or 72 hours ahead. Still others are taking data from the charts to "feed" into electronic computers. These also will compute an estimate of what the maps will be like at given periods in the future.

Finally both the man-made and electronically computed prediction or "prognostic" charts are carefully compared. And a final set of maps is prepared including what appears to be the best features of both. These, too, are sent to offices all over the country to show the expected distribution of high- and low-pressure areas as the starting point for the forecasts to be made.

At a few points (Chicago and Kansas City are examples), special forecast offices go a step further and prepare additional charts showing the broad features of where it's expected to rain, where it will be warmer, where it will be cooler, etc. And these also are passed along to the offices which make the final forecasts.

The State Office . . .

One office in each state has the responsibility for preparing the weather forecast for that state. In Iowa, the office at Des Moines has this job.

In spite of all the analysis, maps, charts, etc. provided up to this point, some of the most difficult steps still remain to be taken in the state forecast office. Here, the

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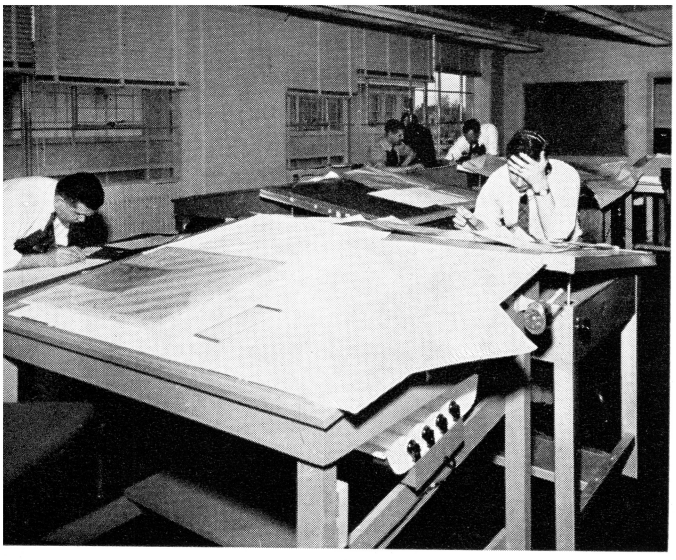
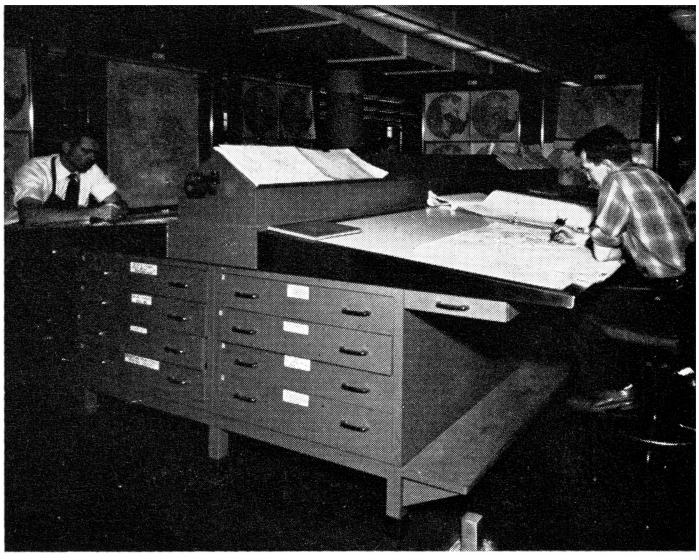
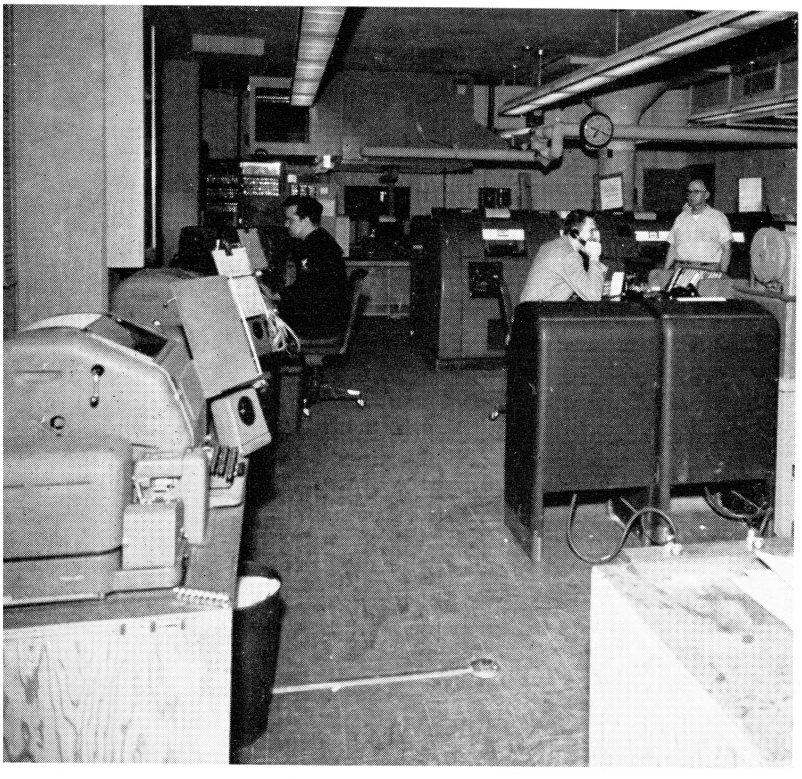






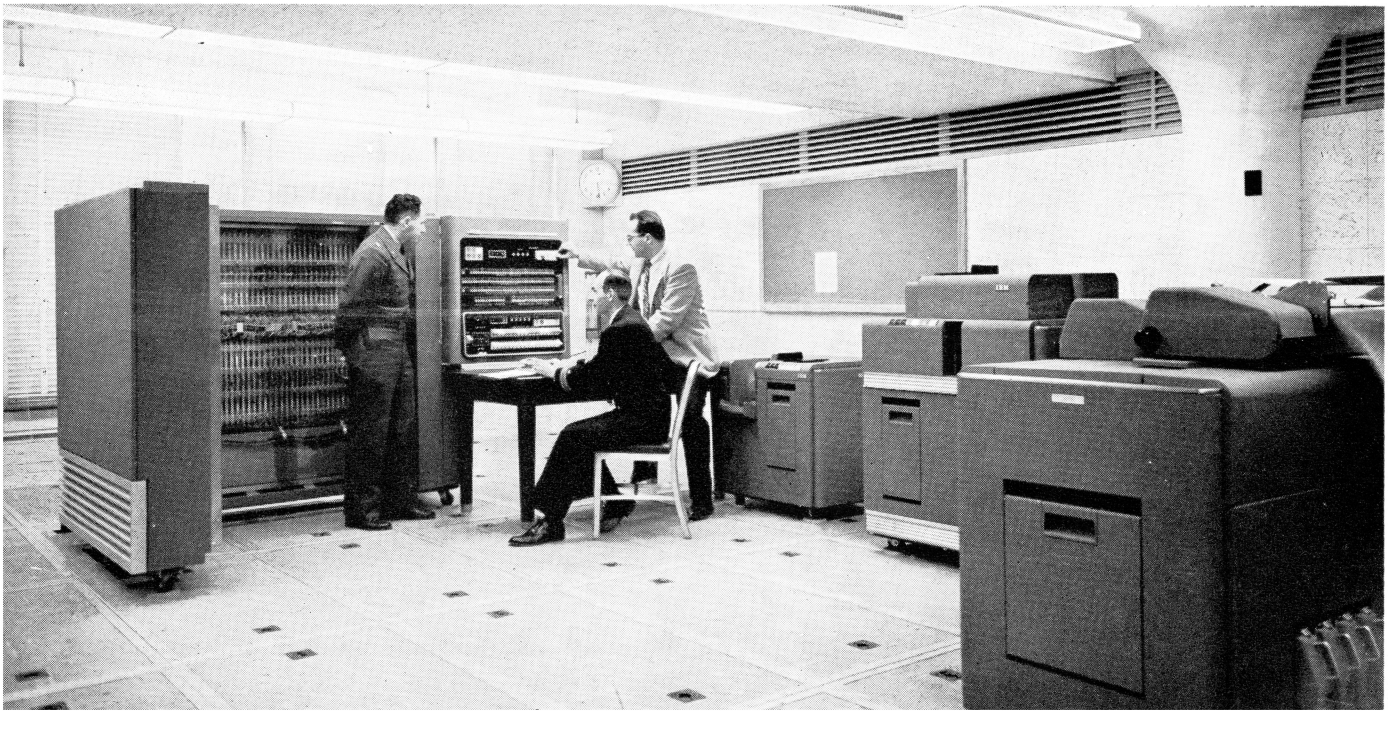
Left Above: Weather Bureau map analysis room. Data from analyzed maps are read over phone to card punchers in adjoining room.

Above: Preparing prognostic maps for surface and aloft. Public and aviation forecasts are based on these maps.

Right Above: Weather maps are prepared and analyzed after data from many hundreds of stations are recorded on blank maps.

Left: A Weather Bureau communications room with teleprinters for transmitting and receiving weather data.

Below: Electronic computers are also used in preparing prognostic charts which are compared with man-made charts.



forecaster has the job of fitting together all of the pieces of the jigsaw puzzle of data and information.

He has the original charts and maps, both for the surface and for several levels aloft. He has the prognostic charts, the estimates prepared at the Analysis Center of what the maps will look like in the future. He has the broad prediction from the District Forecast Office of the weather that can be expected in the general area.

The local forecaster must combine all of these things along with his knowledge of the local terrain and weather characteristics. Then the job is to determine as accurately as possible what weather conditions will develop during the next 1-3 days.

The Forecast . . .

Even if the local forecaster has estimated future weather developments with 100-percent accuracy his task isn't yet over. For general release, he must phrase briefly and simply a weather situation that in itself may be far from simple. Over a 3-day period, for example, there may be an involved series or sequence of changes in cloud conditions. There may be a number of beginnings and endings of precipitation and one or more abrupt or gradual changes in temperature. There may be several separate weather situations over the state at the same time, but in different areas.

To explain all of these factors in words would require a statement much too long to be carried on the press wires. And it would be much too complicated for listeners to remember if broadcast or telecast. So, of necessity, the forecaster must reduce his picture of the developing weather situation to a very simple statement—even at the expense of omitting some details of real significance.

Keep this fact in mind when using the weather forecast, and remember that the actual situation may not develop as simply as the forecast suggests. Guided by the brief forecast, however, and using the pointers we've been passing along in these articles, you can often achieve a much clearer understanding of the weather that's developing. Then you'll be prepared to adapt the forecast as realistically as possible to your own location and to use this information to your advantage in planning work or recreation.

Using Your Knowledge . . .

We've explained why the weather forecasts released must be both brief and simple, even though the weather situation itself may not be simple. In our earlier articles, on the other hand, we've tried to outline many of the factors and principles regarding weather, its development and consequences. You can couple your knowledge of these to the daily weather forecasts. Let's consider just one example:

Suppose the weather forecast predicts showers in your part of the state. Does this mean you can count on enough moisture to help the corn crop or to get you out of a lawn-watering job? Not necessarily! It means that the forecaster foresees the development of that kind of cloudiness that results in local and temporary precipitation. A shower may develop over an area from 1 to 10 miles across and may move across the country for several miles, then dissipate. Another shower area, meanwhile, may be developing perhaps 30 miles away. It, too, will drift along for awhile and then come to an end.

So a particular point in a city or on a farm may: (1) receive a heavy shower; (2) receive only a light sprinkle of rain if at the edge of the storm; (3) be within view of the shower in the distance but receive no rain; or (4) be further than even visual distance from the storm. In all four situations, the "shower" forecast was equally good. But, because of the local and spotty nature of showers, different locations receive different amounts of rain or none at all.

With your knowledge of the principles, then, when a shower forecast is made, you know that a particular location may or may not receive precipitation—and in relatively large or small amounts if it does.

Forecasts are broadcast and telecast at frequent intervals. The forecast and an accompanying weather map are published in many newspapers. Clouds appear overhead or on the horizon for all to see. Temperature changes and wind variations are easily noted as are changes in air pressure if you have a barometer. These are the elements you can combine to make your knowledge and forecast for your own location as accurate and useful as possible.